## REMARKS

Claims 1-11 are pending in this application. Claim 1 is currently amended to correct a typographical error in the claim. The Examiner has acknowledged that claim 3 is directed to allowable subject matter.

Claims 1, 2 and 4-11 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,223,593 to Kubisiak et al. (hereinafter "the Kubisiak patent"). In view of the following remarks, the Applicants respectfully request reconsideration and withdrawal of this rejection.

As set forth in independent claim 1, the present invention is directed to a flowmeter including a resistive heater inserted into a fluid, an AC power with a first frequency to periodically heat the resistive heater, a signal processing unit for detecting a signal generated in the resistive heater in relation to a temperature variation of the resistive heater by the AC power and obtaining a phase lag of the first signal relative to the heat generation in the resistive heater, and an operation unit for calculating a flow rate of the fluid based on the obtained phase lag.

As set forth in independent claim 9, the present invention is also directed to a method of mapping phase lags to flow rates including the steps of: a) providing a resistive heater in fluid moving at a predetermined flow rate, b) supplying AC power with a first frequency to the resistive heater, c) detecting a first signal which is related to a temperature variation of the resistive heater, d) obtaining a phase lag of the first signal relative to the heat generation in the resistive heater, e) measuring the flow rate of the fluid, f) repeating the steps b) through e) while varying the flow rate of the fluid and g) mapping measured flow rates of the fluid to phase lags of the first signal.

The Kubisiak patent is directed to a self-oscillating fluid sensor for detecting selected fluid properties and discloses a variety of embodiments of the self-oscillating fluid sensor. The Examiner relies on the embodiment disclosed at column 16, line 54 – column 18, line 27, of the Kubisiak patent. This embodiment derives the thermal conductivity of a fluid from the phase or time lag of a single heater element 600. To determine the thermal conductivity, the heater element 600 is exposed to the fluid at substantially zero flow. A processor 626 receives the frequency oscillation of the circuit via interface 624 and computes the time lag associated with the internal phase lag of the heater element 600. From this information, the thermal conductivity of the fluid of interest can be determined. The

Kubisiak patent also describes other embodiments that can determine the velocity or flow rate of the fluid. However, the Examiner did not rely on these embodiments, and they require additional sensors, as well as a heater element, to determine the flow rate (see column 3, line 38 – column 4, line 29).

Regarding claim 1, the Kubisiak patent discloses that the flowmeter calculates flow rate from an oscillation frequency using an additional sensor (see column 3, line 38-44 and Fig 10). In the Kubisiak patent two respective fluid sensors are used for detecting selected fluid properties including conductivity and flow rate. In contrast, claim 1 requires "calculating a flow rate of the fluid based on the obtained phase lag". The flowmeter of claim 1 uses a single resistive heater and no additional sensors to determine the phase lag and ultimately the flow rate. Such a feature allows the flowmeter of the present invention to have a wide measurement range and high measurement accuracy while also having a simplified structure. The Kubisiak patent does not teach or suggest calculating the flow rate of a fluid from the phase lag. Furthermore, each fluid sensor in the Kubisiak patent detects different signals for calculating the fluid properties than in the present invention. For example, the phase lag or time lag between the heater-input signal and the temperature response is considered as an error source in the Kubisiak patent (see column 4, line 7-13) instead of being used to determine the flow rate as in the present invention.

Further regarding claim 1, the Examiner contends that phase shifter 608 and amplifier 610 in the Kubisiak patent are equivalent to the signal-processing unit of the present invention. Phase shifter 608 provides an additional phase shift to the differential output signal, and amplifier 610 is part of an automatic gain control circuit that keeps the loop gain equal to one. Phase shifter 608 and amplifier 610 also provide a feedback path from the differential output of the Wheatstone bridge 604 to the heater energizing amplifier 612. These functions, however, are not equivalent to the "detecting a first signal generated in the resistive heater in relation to a temperature variation of the resistive heater by the AC power, and obtaining a phase lag of the first signal relative to the heat generation in the resistive heater" performed by the signal processing unit of claim 1. Therefore, the phase shifter 608 and amplifier 610 disclosed in the Kubisiak patent are not the same as the claimed signal processing unit of the present invention.

The Examiner also contends that calculating the thermal conductivity of a fluid is equivalent to calculating the flow rate. The Applicants do not agree with this

contention. The thermal conductivity of a fluid is the ability of a material to conduct heat, whereas the flow rate of a fluid is the volume of material passing a fixed point per unit time. These two fluid properties are fundamentally different, and the Applicants believe that a sensor for determining thermal conductivity cannot be equated to a sensor for determining flow rate.

For the foregoing reasons, the Applicants believe that claim 1 is patentable over the Kubisiak patent and the other prior art of record and is in condition for allowance.

In addition, the Kubisiak patent does not teach or disclose the method of claim 9 for the same reasons as described above with regard to claim 1 and for the following reason. The Kubisiak patent describes that the heater element is preferably exposed to fluid at substantially zero flow (see column 17, lines 44-46). Claim 9, however, requires, "providing a resistive heater in fluid moving at a predetermined flow rate". Fluid moving at a predetermined flow rate does not correspond to fluid at substantially zero flow as the Examiner contends. Therefore, the Kubisiak patent does not teach or suggest the elements recited in claim 9.

For the foregoing reasons, the Applicants believe that claim 9 is patentable over the Kubisiak patent and the other prior art of record and is in condition for allowance.

Claims 2-8, 10 and 11 depend from independent claims 1 and 9 (or a subsequent dependent claim) and are patentable for at least the reasons discussed hereinabove in connection with independent claims 1 and 9. Claims 2-8, 10 and 11 are likewise believed to be in condition for allowance.

On the Office Action Summary (Form PTOL-326), the Examiner has indicated that there is an objection to the specification. However, no such objection was advanced in the Office Action. Therefore, the Applicants request that the Examiner advance a basis for such an objection or withdraw the objection.

## CONCLUSION

Based on the foregoing remarks, reconsideration and withdrawal of the rejections and allowance of pending claims 1-11 are respectfully requested.

Should the Examiner have any questions, or wish to discuss the application in further detail, the Examiner is invited to contact Applicants' undersigned representative by telephone at 412-471-8815.

Respectfully submitted,

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